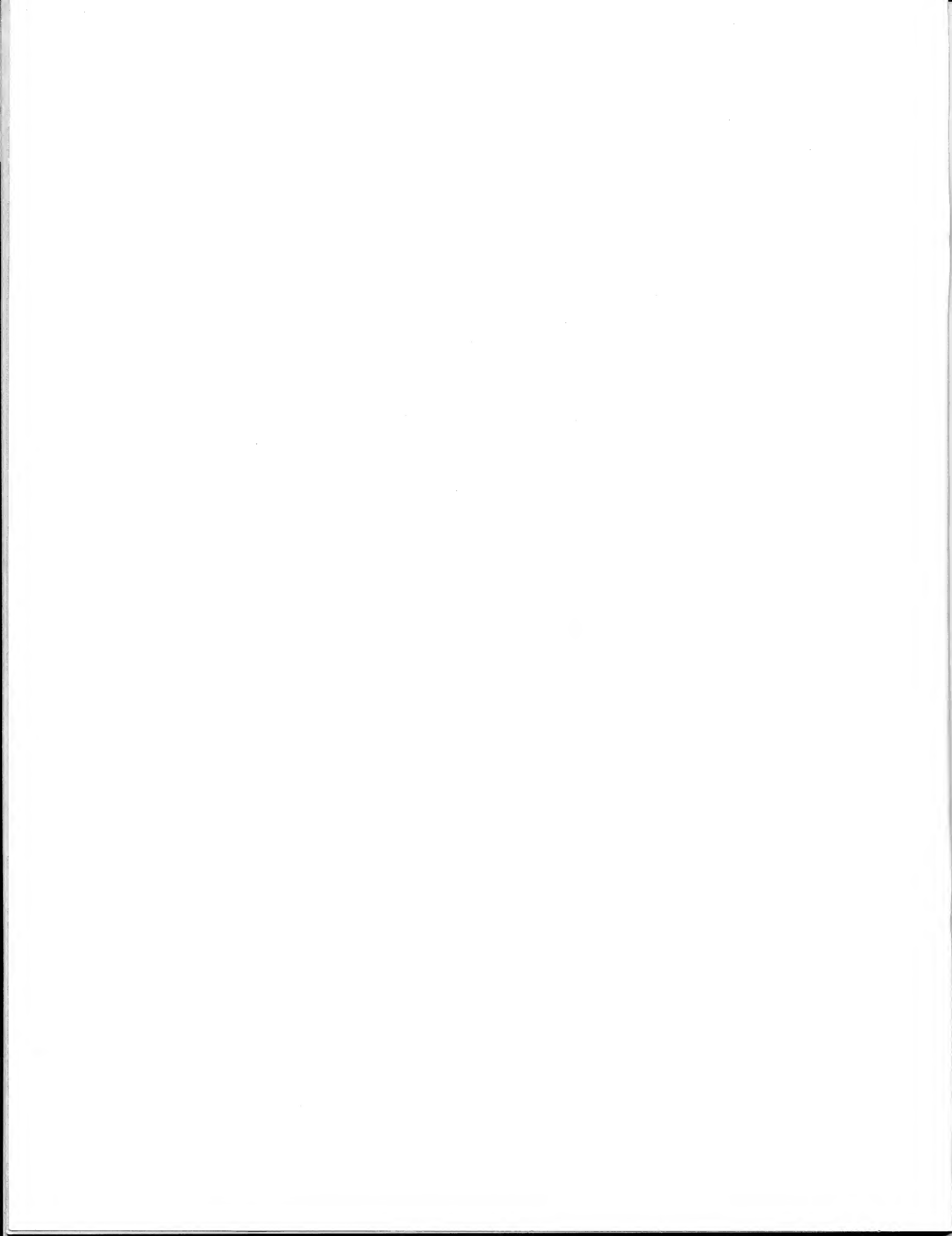


**CONNECTORS
FOR
MICROMINIATURE
CIRCUITS**

by
HOMER E. HENSCHEN
Development Project Manager
Connector Products Division
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It seems that the only thing standard about packaging microminiature circuits is that each system is different. Component manufacturers and users each seem to prefer proprietary systems. For connector manufacturers, it means that many special connectors are necessary to satisfy the various requirements. We try to use fully developed and tested contacts in these connectors to keep the unknowns to a minimum. We have tried to keep the variety of contacts to a minimum but have found that one or two types are not sufficient to meet the requirements for the many styles of connectors. Incidentally, in this paper I will discuss only two-piece connectors. While one-piece connectors are used extensively in the electronic packaging industry, space and time limitations prevent adequate coverage here of both styles.

Microcircuitry itself is presently available in many forms with units packaged principally in flat packs, transistor cans or cubical cases. Innumerable variations are available in each of these package types. I'll show first typical connectors for plugging microcircuits at the unit level.

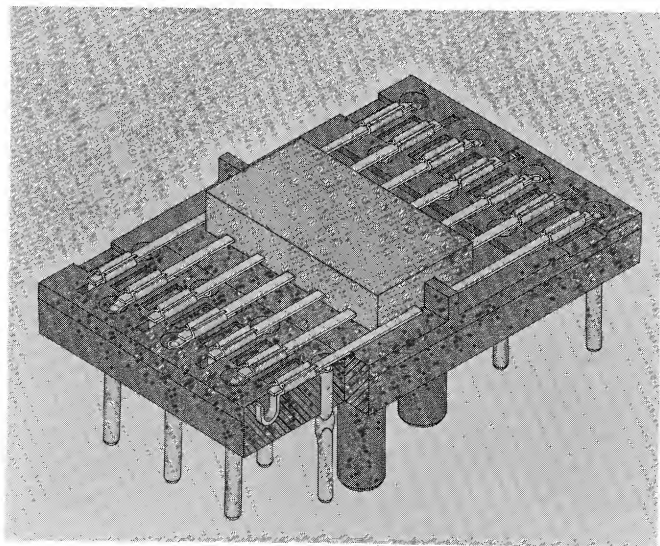


Figure 1

CRIMP PACK CARRIER

Microcircuit Connectors:

Figure 1 shows a carrier with a flat pack crimped to its contacts. The carrier pins are considerably more rugged than the pack's flat ribbon leads and offer more versatility. They can be inserted into holes in a printed circuit board and soldered or can be plugged into a receptacle like the one shown in Figure 2. This unit is panel mounted and provided with posts which accept TERMI-POINT* clips for back panel wiring.

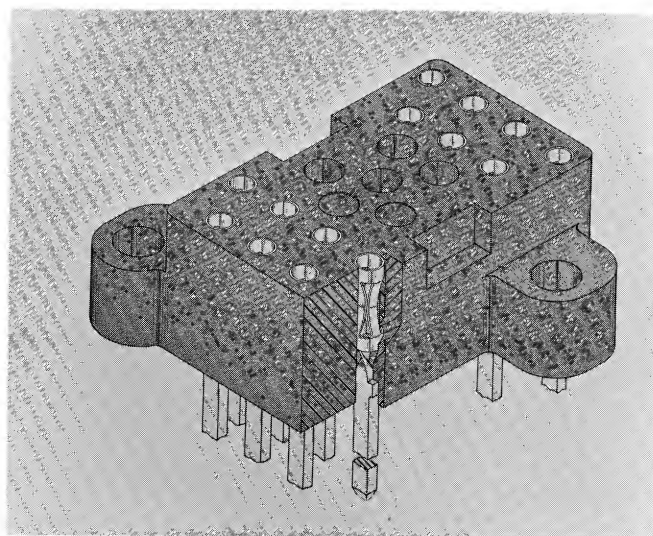


Figure 2

CRIMP PACK RECEPTACLE

Printed or flexible circuitry can be used for common power and ground planes. Keying against insertion of the wrong carrier is provided.

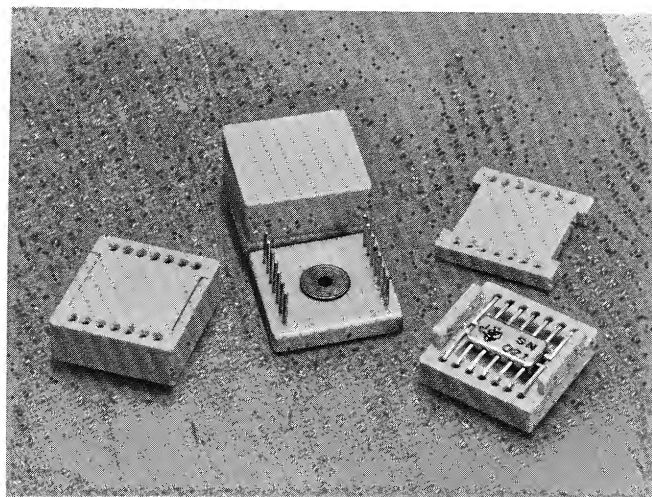


Figure 3

HELICAL FLAT PACK CONNECTOR

Figure 3 shows a helical flat pack connector. The flat pack leads are bent at right angles and inserted into the helical springs contained within the contact cavities. Thus, the leads become an integral part of the socket contact without the necessity for welding or soldering. The pin headers are mounted on a circuit board. Pluggability is achieved in an area smaller than required for planar mounting of the flat packs.

Transistor cans can be made pluggable to boards by inserting and flow soldering miniature spring contacts as shown in Figure 4. Since the contacts are

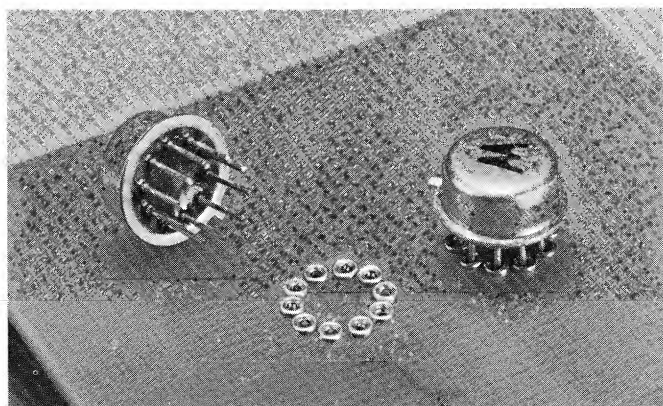


Figure 4

MINIATURE SPRING CONTACTS FOR TO-5 CAN

individually mounted, the user can arrange them as desired to fit any of the wide variety of transistor cans which are being used to package integrated circuits. Figure 5 shows the same contacts with posts which

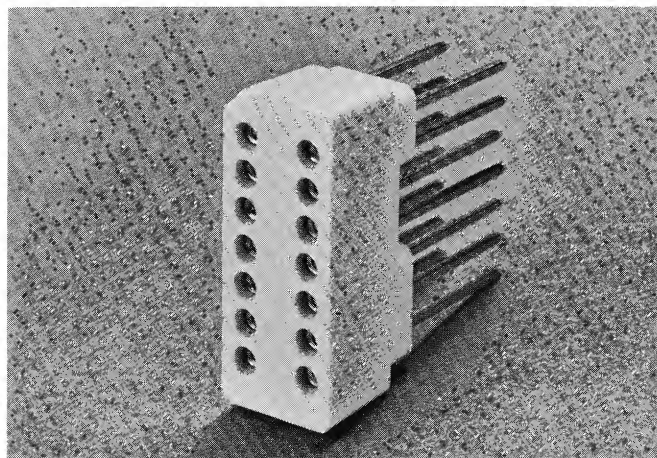


Figure 5

14 POS. MINIATURE SPRING RECEPTACLE

accept TERMI-POINT clips in a 14 position block. This receptacle will be recognized as being suitable for plugging some of the commercial integrated circuits and film type hybrids packaged in cubical cases with pins emerging from one face.

As can be seen from these illustrations, a wide variety of packaging schemes is possible with the requirement that each unit of the microcircuits be pluggable. As the units are grouped together and inter-

wired, different families of connectors are necessary for plugging the resulting modules. The following illustrations are typical examples.

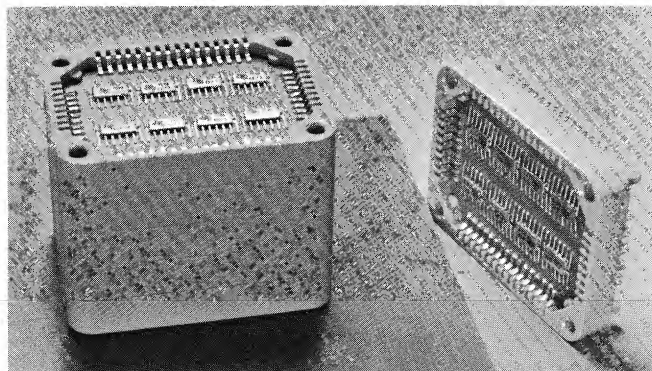


Figure 6

50 POS. TYPE IX STACKING CONNECTORS

Module Connectors:

Figure 6 is a connector suitable for housing eight flat packs or some other small group of pre-wired microcircuits. The contacts are one-piece Type IX active pins and are pluggable to plated holes in a board. They can be flow soldered, if desired, after the circuit test and burn-in phase has been completed. The module is still removable, of course, by standard unsoldering techniques. Additional connectors can be stacked on the first. The wiring up through the stack is accomplished by means of the contacts and is programmable. A special receptacle with crimp-on, snap-in contacts could be used for interwiring the stacks instead of circuit boards.

Figure 7 shows a 44 position helical connector with contacts on 1/16" staggered centers. Sixteen keying positions are possible with the guide pins and sockets. Other helical connectors are available with contact spacings down to .050" as illustrated by the 24 position receptacle shown in Figure 8. This unit also illustrates the use of a unique feature of helical contacts. The very long tails are the tab portion of the contact assembly and are fanned out for attachment to the microcircuit without introduction of another interface.

MECA* connectors are also available in spacings of .050" as shown by the 160 position, right angle connector shown in Figure 9. There are two rows of contacts resulting in a net spacing on the motherboard of .025". This unit has met the specifications for use in Minuteman. As can be seen, provision for keying is included in the connector design. The mating blade

half to this plug mounts on a printed circuit board but other MECA connectors suitable for use in connecting boards to wire, flat flexible cable or back panel wiring using TERMI-POINT clips are available.

Several connector styles with AMPMODU* contacts are used with programmed wiring systems.

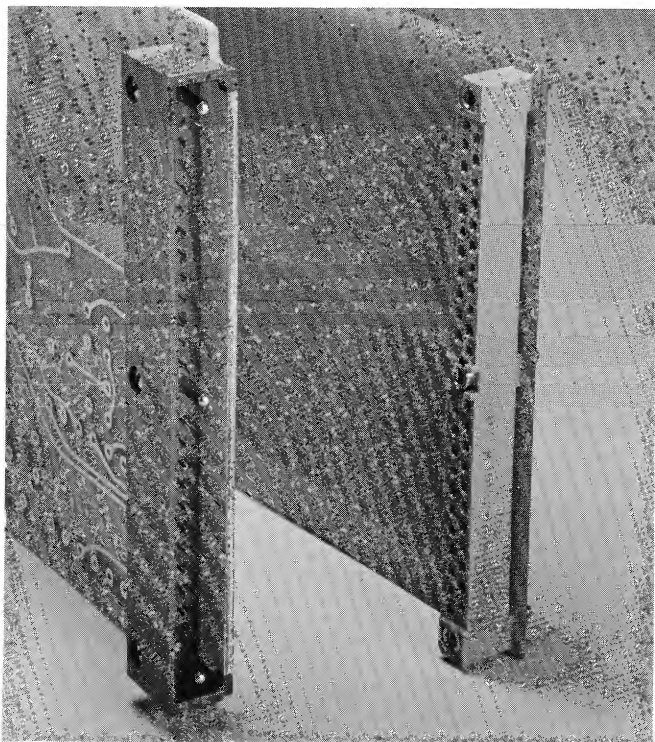


Figure 7

44 POS. HELICAL RIGHT ANGLE CONNECTOR

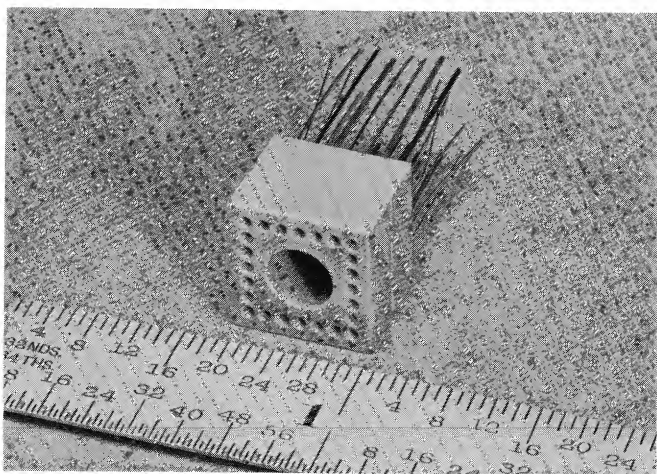


Figure 8

24 POS. HELICAL RECEPTACLE

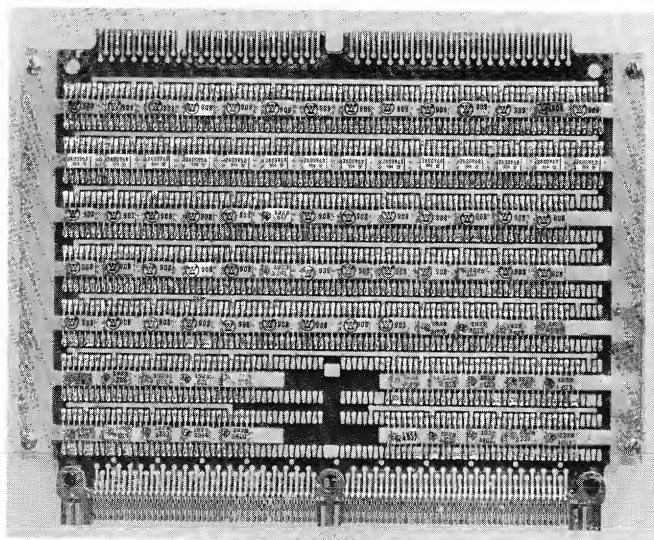


Figure 9

160 POS. MECA RIGHT ANGLE CONNECTOR

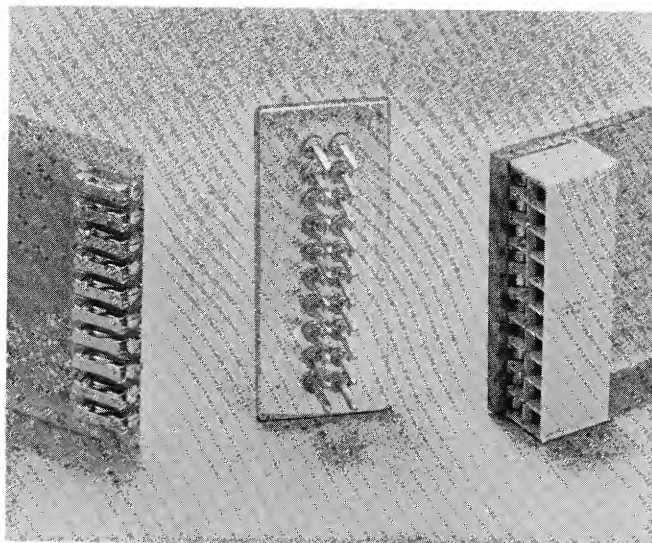


Figure 10

AMPMODU CONNECTORS, GRID PLATE HEADERS

This is illustrated in Figure 10 where one card has contacts staked to its edge while the other card has contacts pre-assembled in a two-row housing. Either of these styles will mate with pins mounted in a grid plate, as shown, or molded-in pin headers. The AMPMODU contacts, whether staked or pre-assembled, provide for a large size and location tolerance on the mating pins. Contact is made by two long cantilever beams which are protected from overstressing by stops in the contact body.

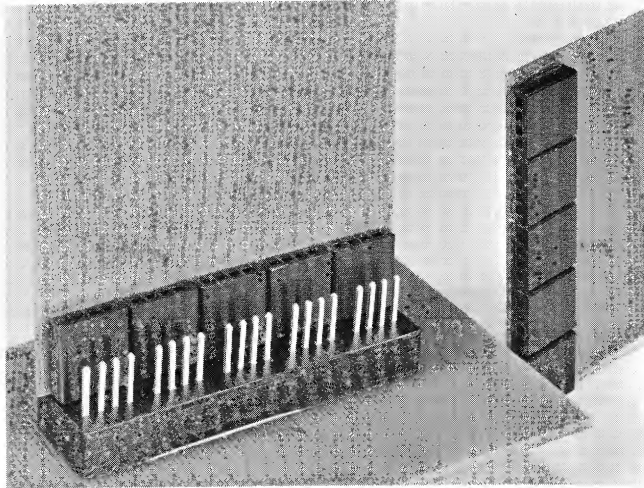


Figure 11

20 POS. BOX CONTACT CONNECTOR

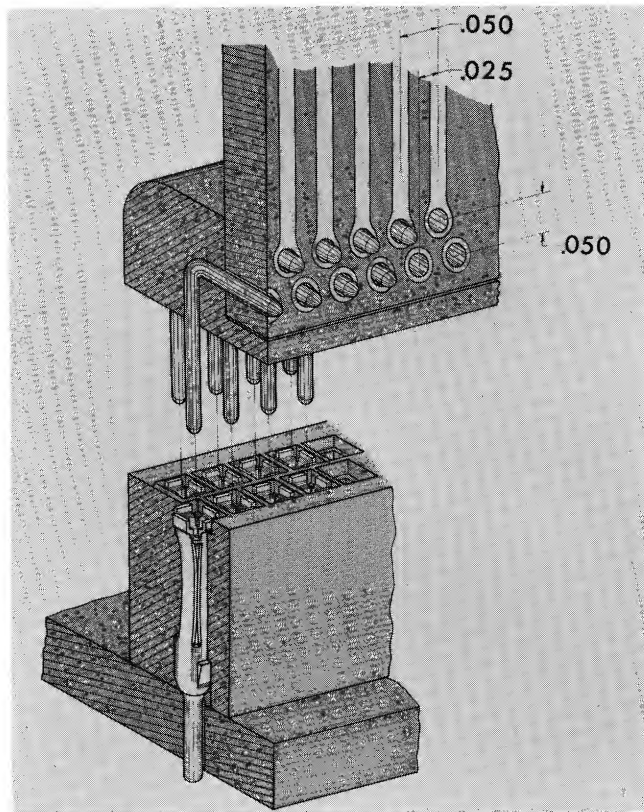


Figure 12

RIGHT ANGLE BOX CONTACT CONNECTOR

Figure 11 shows another connector suitable for mating with posts which will accept TERMI-POINT clips. Box contacts are spaced at .075" in this right angle connector. Four elliptical beams make contact with the pins. These contacts are pre-assembled in plastic blocks with the cavities sized to provide oversized pin protection. Because of its symmetrical construction, this contact is equally suitable for mating with round pins. Figure 12 shows a two-row right angle connector with contacts in each row spaced at .050" for a net spacing of .025".

Subsystem Connectors:

The interwiring in these modules has been accomplished by one form or other of printed circuit boards resulting in planar structures. When these are grouped and interwired, the resulting shape is usually a parallel prism and the packaged assembly is commonly called a "black box" or subsystem. At this level, the packaging system usually involves the connection of cables with rack and panel or circular connectors. Figure 13 shows a 37 position, shell size 14 CH-AMP* connector. Other standard sizes in this family of environmentally sealed connectors have as many as 85 size 22 crimp-removable contacts. The same contacts are used in sealed or unsealed rectangular connector designs.



Figure 13

CH-AMP 37 POSITION #14 SHELL SIZE CONNECTOR

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